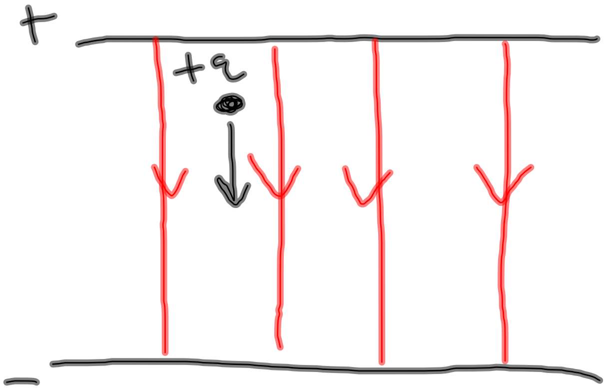
- Electric Potential Energy:



$$\Delta U_e = -q\bar{E}\cdot\bar{d}$$

$$= -qEd\cos\theta$$

- Electric Potential Difference:

$$\Delta V = \frac{\Delta U_e}{q}$$

$$\Delta U = q\Delta V$$

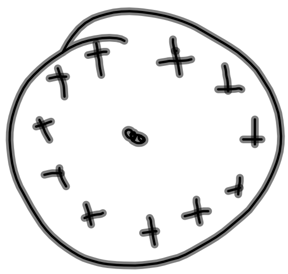
– Work needed to move a charge:

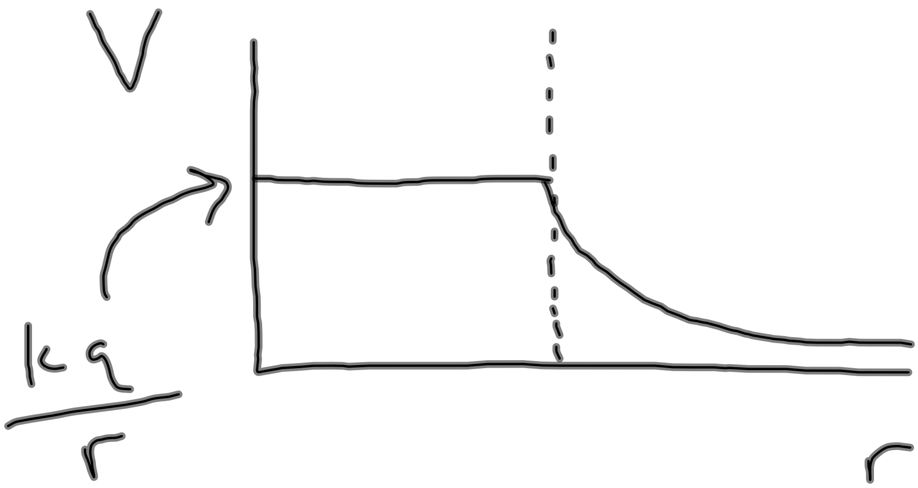
$$W = \cancel{\Delta K}^{0} + \Delta U_e$$

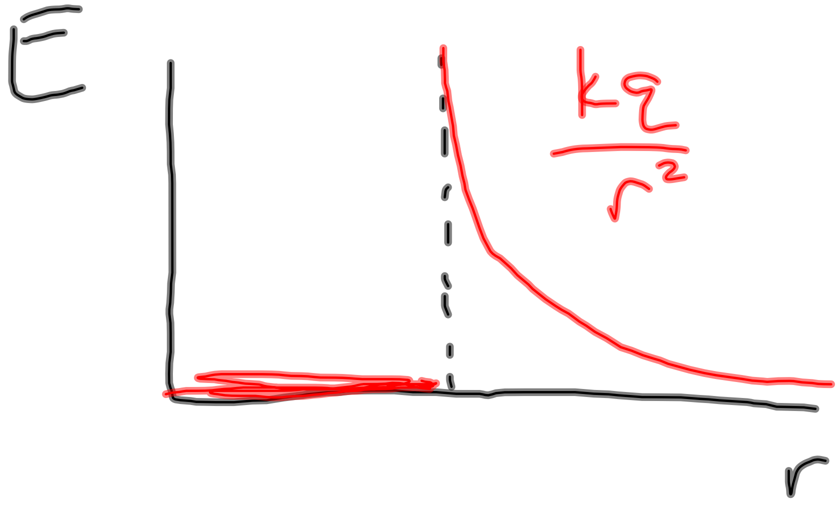
$$= \Delta U_e = q\Delta V$$

(ignoring gravitational effects; starts and finishes at rest)

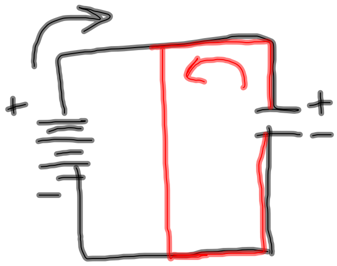
- charge for a conducting sphere:







- Capacitors:



$$I(t) = I_0 e^{-t/RC}$$

$$C \equiv \frac{Q}{\Delta V}$$

$$\tau = RC$$

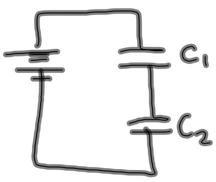
↳ time constant

Energy stored in a capacitor:

$$E = \frac{1}{2} QV$$
$$= \frac{1}{2} CV^2$$
$$= \frac{1}{2} \frac{Q^2}{C}$$

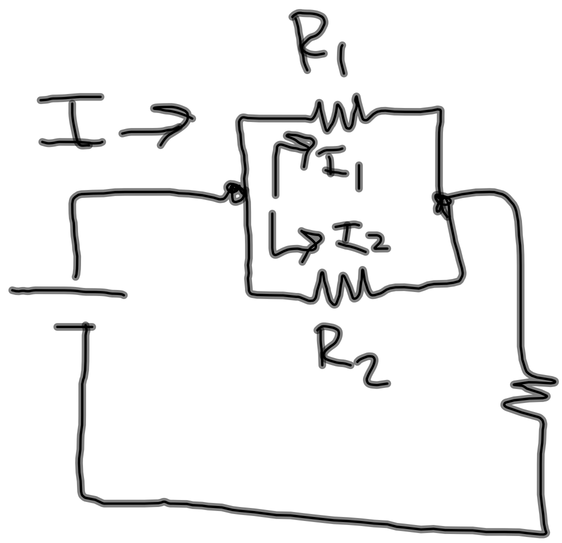
– CPA

capacitors parallel add



$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2}$$

- Pieces in series share current, pieces in parallel share voltage.



$I = I_1 + I_2$

- Magnetic force: (free charge)

$$\bar{F}_B = q\,(\bar{v} \times \bar{B})$$

$$= |q|\, v\, B \sin\theta$$